



AVL Special Purpose Powertrain

EDF-2021-ENERENV-DA-EEMC "INDY"

EDF-2024-ENERENV-DA-EEMC-STEP "SENTINEL"

Prof. Dr. Gerhard Skoff, Dr. Bernhard Peischl

AVL at a Glance



1948

Founded



26

Countries
Represented



12,200

Employees Worldwide



10 %

Of Turnover Invested
in Inhouse R&D

75+

Years of Experience

45

Global Tech and
Engineering Centers

68 %

Engineers and
Scientists

2,200

Granted Patents
in Force



Looking Beyond the Limits of Technology

Passion for Innovation

Together with an international network of experts and with more than 50 Tech and Engineering Centers worldwide, we drive sustainable mobility trends for a greener future.

10 %

Of Turnover Invested
in Inhouse R&D

100+

University
Cooperations

2,200

Granted Patents
in Force

200+

Projects within
European Programs
for R&D

Industry-Wide Value Creation

With future-proven tools, products and systems, augmented by our global network of experts and facilities, we support OEMs and Tier1s to shape current and future technologies for all industries.



Passenger Cars



Commercial Vehicles



Racing



Agriculture



2 and 3-Wheelers



Defense



Rail

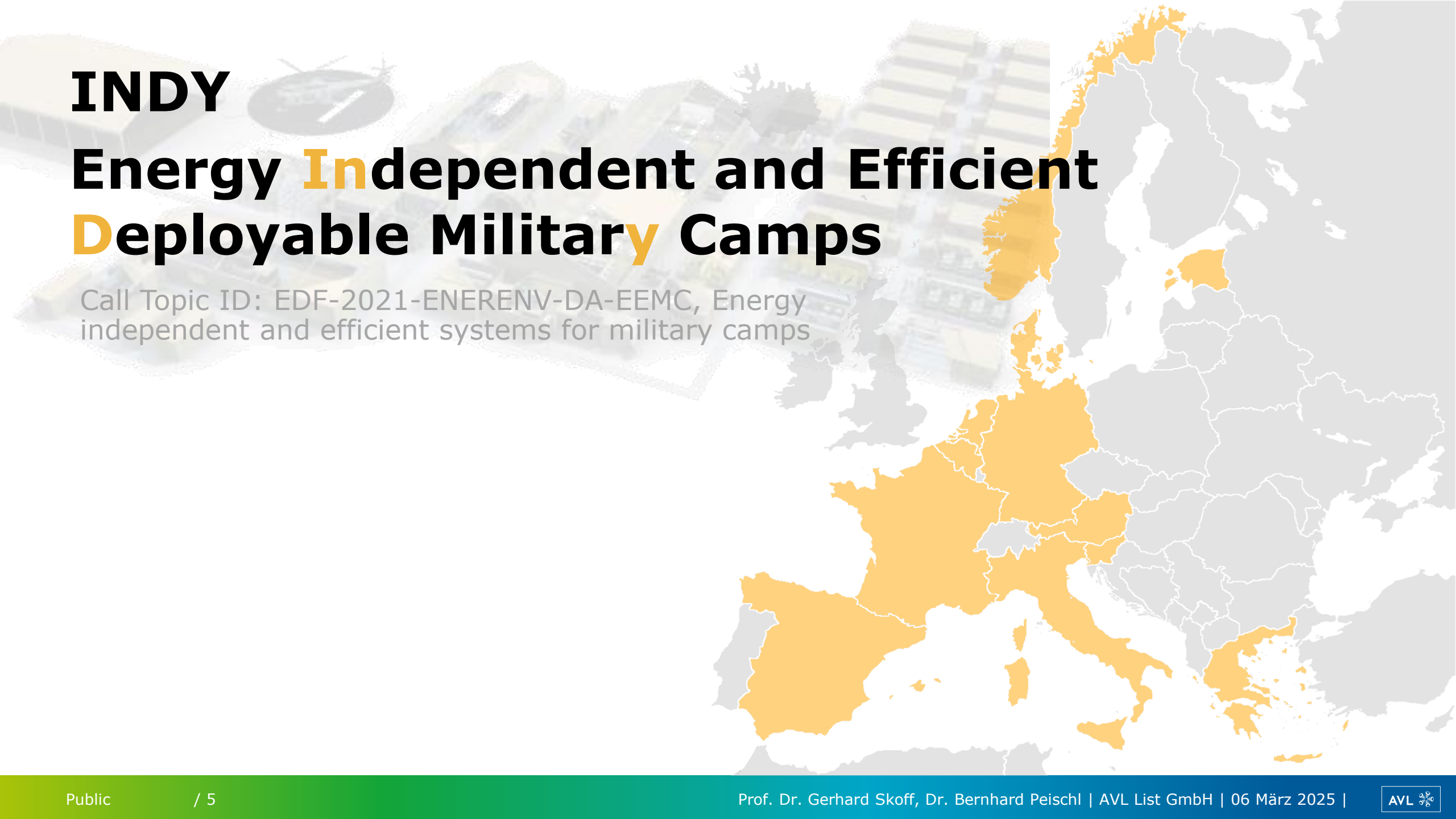


Aviation



Industrial Energy





INDY

Energy **I**ndependent and Efficient **D**eployable Military **y**Camps

Call Topic ID: EDF-2021-ENERENV-DA-EEMC, Energy independent and efficient systems for military camps

EDF-2021-ENERENV-DA-EEMC “INDY”

CALL TITLE:	Energy efficiency and energy management
TOPIC TITLE:	Energy independent and efficient systems for military camps
DURATION OF THE PROJECT:	24 months
TYPE(S) OF ACTIVITIES:	Studies
ESTIMATED TOTAL COST:	€ 14,229,475.59
MAXIMUM EU CONTRIBUTION :	€ 14,229,475.59



SHORT DESCRIPTION OF THE PROJECT:

INDY will develop a strategic roadmap towards future energy independent and efficient deployable military camps.

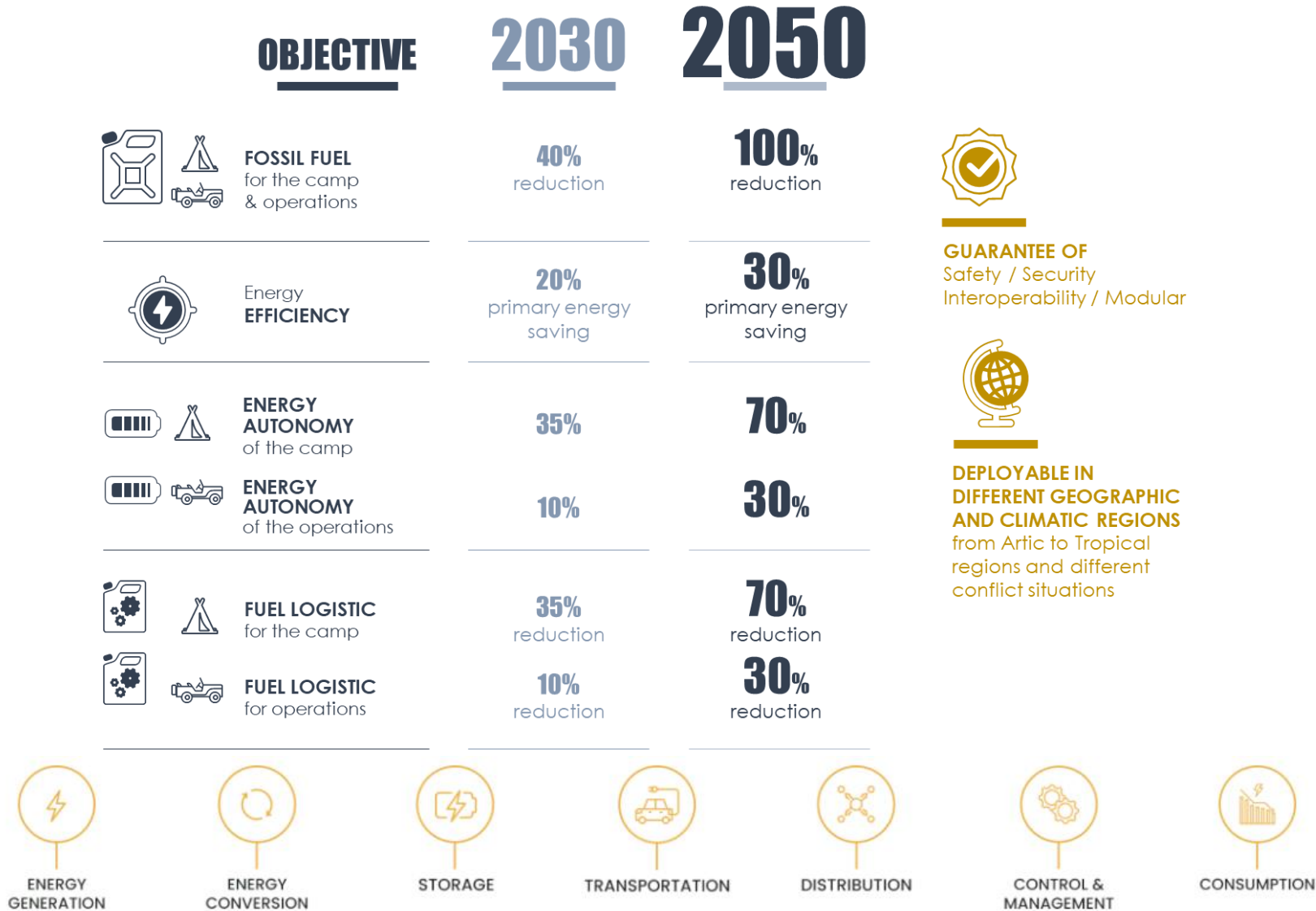
The project “Energy Independent and Efficient Deployable Military Camps” (INDY) aims to develop a strategic roadmap towards the future energy independent and efficient deployable military camps, based on a paradigm shift for energy production, conversion, storage, transport, distribution and final usage. The project is building on military and civilian EU and national projects.

Related PESCO project: Energy Operational Function (EOF)

Source: EDF-2021-ENERENV-DA-EEMC, INDY Proposal.

INDY Partners and countries involved

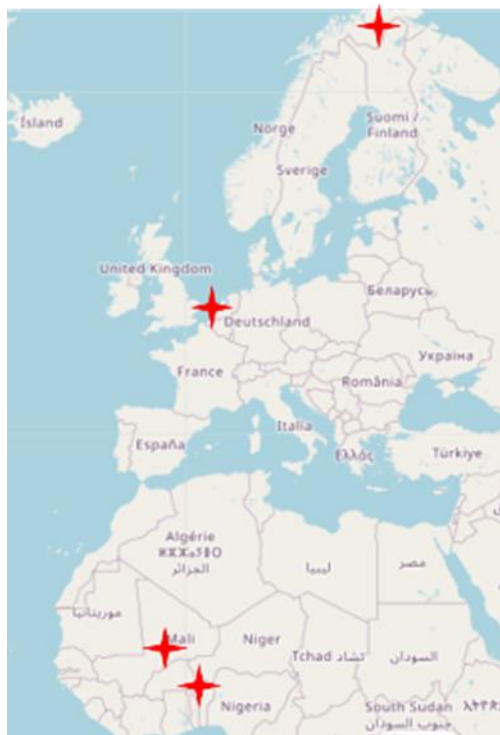
Partner abbr.	Partner / Beneficiary	Country
BE1 (C00) - TEC	TECES, Green Tech Cluster (SI)	SI - Slovenia
BE2 - CEA	The French Alternative Energies and Atomic Energy Commission (FR)	FR - France
BE3 - TNO	The Netherlands Organisation for applied scientific research (NL)	NL - Netherlands
BE4 - RHE	Rheinmetall Electronic AG (DE)	DE - Germany
BE5 - AIR	AIRBUS Defence and Space (DE)	DE - Germany
BE6 - ARP	Equipos Móviles de Campaña ARPA, SAU (ES)	ES - Spain
BE7 - AVL	AVL (AT)	AT - Austria
BE8 - CAF	CAFA TECH (EE)	EE - Estonia
BE9 - CNV	CNV (BE)	BE - Belgium
BE10 - IFE	Institute for Energy Technology (NO)	NO - Norway
BE11 - FRA	Fraunhofer-Gesellschaft (DE)	DE - Germany
BE12 - HEN	HENSOLDT (FR)	FR - France
BE13 - IND	INDRA (ES)	ES - Spain
BE14 - INE	INEO DEFENSE (FR)	FR - France
BE15 - INT	INTA, National Institute for Aerospace Technology (ES)	ES - Spain
BE16 - IDE	INTRACOM DEFENCE SINGLE MEMBER S.A. (GR)	GR - Greece
BE17 - JOC	JOHN COCKERILL (BE)	BE - Belgium
BE18 - KOL	KOLEKTOR (SI)	SI - Slovenia
BE19 - LEO	LEONARDO (IT)	IT - Italy
BE20 - ULJ	University of Ljubljana (SI)	SI - Slovenia
BE21 - UMB	University of Maribor (SI)	SI - Slovenia



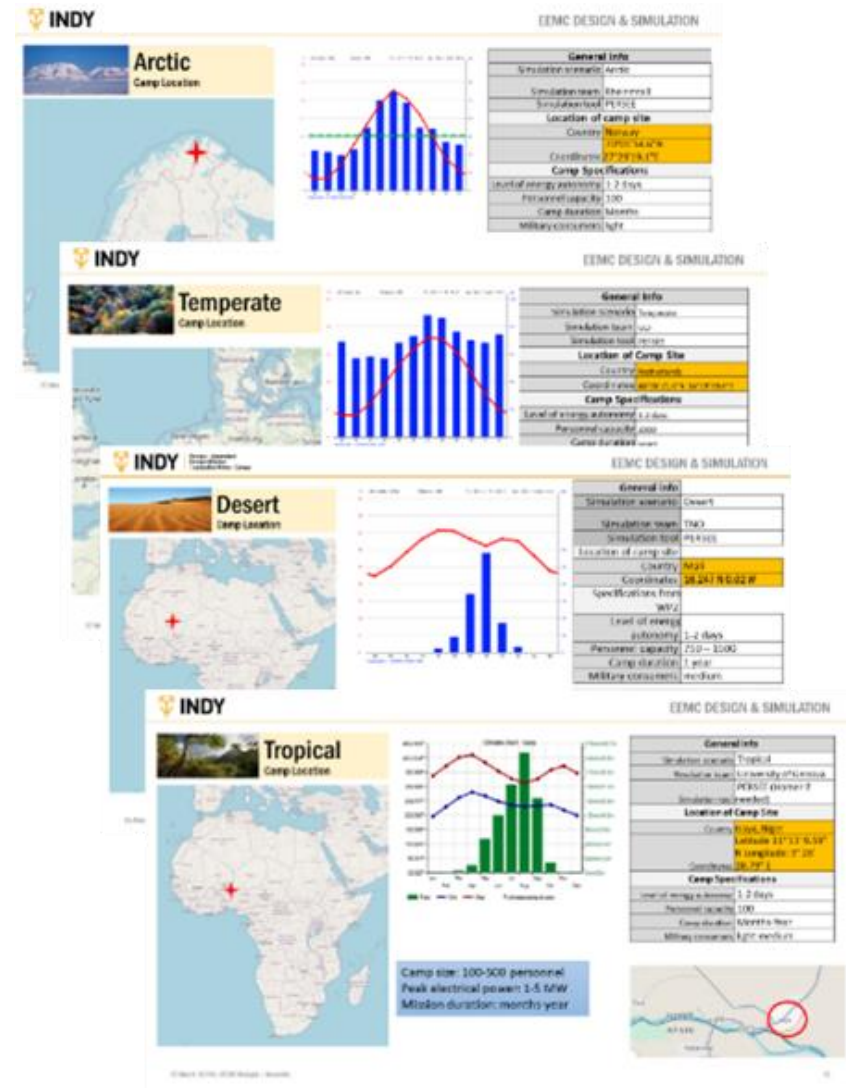
Source: 5th All Partners Event – Presenting Roadmaps, INDY.

4 case studies

- Artic
 - Temperate
 - Desert
 - Tropical
- 3 scenarios
- Legacy
 - 2030
 - 2050

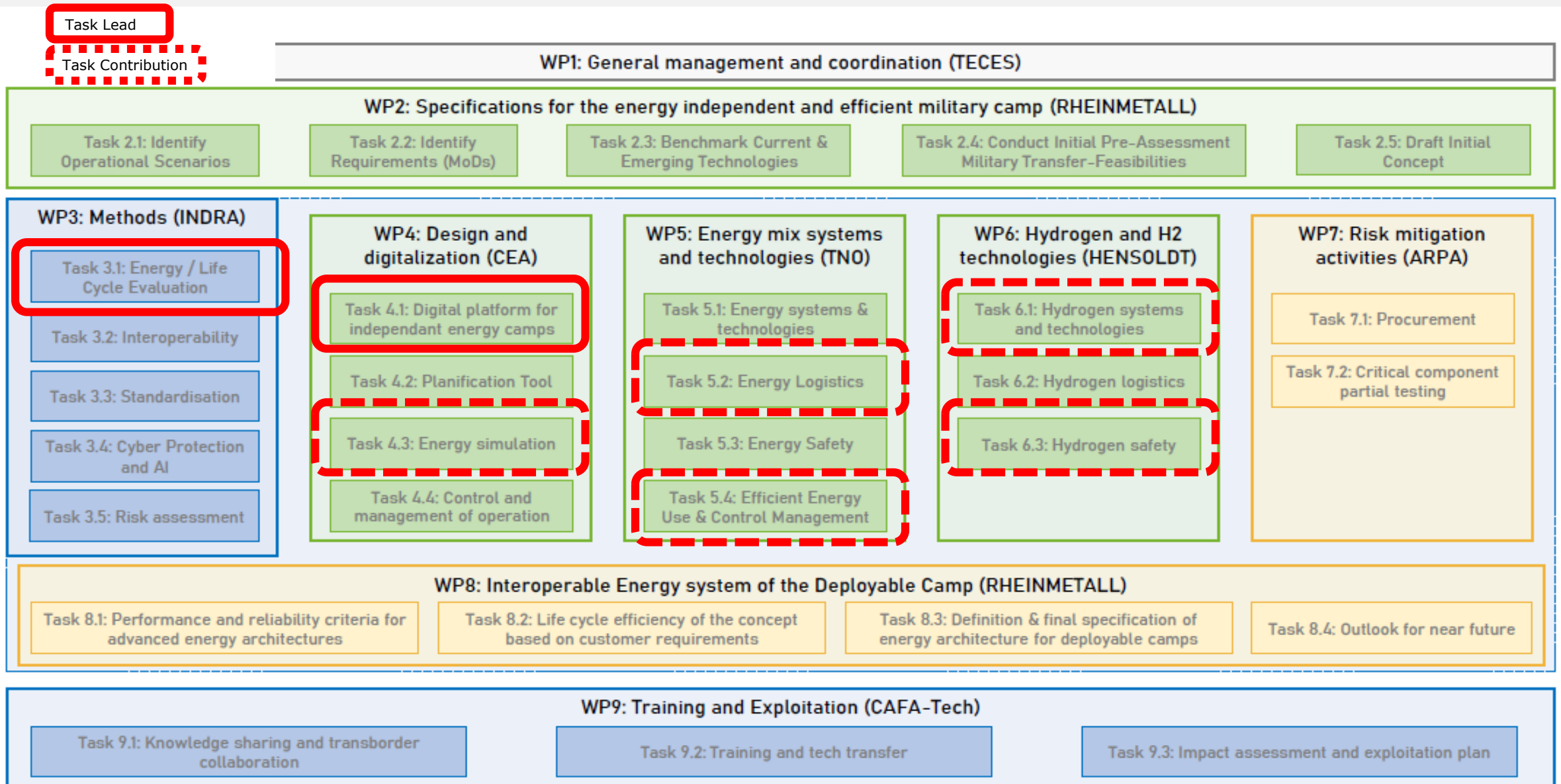


Climate	Personal capacity			Electrical power			Camp duration			Mil. consumers		
	100	1000	2000	100 kW	5 MW	20 MW	mths	year	years	light	med	heavy
Arctic	X			X			X			X		
Temperate*			X			X			X			X
Desert		X			X			X			X	
Tropical*	X			X			X			X		



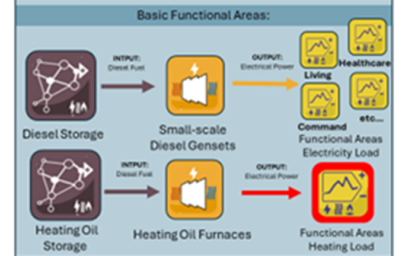
Source: 5th All Partners Event – Presenting Roadmaps, INDY.

INDY Project breakdown structure



Source: EDF-2021-ENERENV-DA-EEMC, INDY Proposal.

Camp Energy Architecture



INDY OBJECTIVES

1. Carbon Footprint
14,000
tonnes CO₂

2. Energy Efficiency
45.3%

3. Energy Autonomy
0%
renewable energy

4. Fuel Logistics
5.3
Million Liters of fuel

5. Costs
CAPEX: 2.5 M€
OPEX: 8.4 M€
10.9 M€

Targets:

40%**20%****35%**

2030 SCENARIO

-35%**-10%**

Total Installed Capacity 5.8 MW

Diesel Genset
3.5 MW

Diesel Heater
2.3 MW

Total Energy Production 23,000 MWh

Diesel Genset
16,500 MWh

Diesel Heater
6,600 MWh

INDY OBJECTIVES

1. Carbon Footprint
48%

Reduction in tons CO₂ emissions

2. Energy Efficiency
32%

Primary energy saving

3. Energy Autonomy
37%

Share of renewable energy

4. Fuel Logistics
-48%

Reduced Fuel Imports

5. Costs
CAPEX: +34%
OPEX: -48%

-29% €
1 year duration

Legacy Scenario



Installed Capacity (MW)

Rooftop PV,
5.7 MW

Diesel CHP,
2.7 MW

Diesel Genset,
1.4 MW

Installed Storage (MWh)

Diesel Storage,
150 MWh

Heat Storage
9 MWh

Battery,
0.4 MWh

Energy Production / Conversion / Storage (MWh)

Diesel Storage,
27,600 MWh

Diesel CHP,
6350 MWh_H

Rooftop PV,
8720 MWh

Diesel CHP,
4610 MWh_E

Diesel Genset, 5240 MWh

Heat Storage
1580 MWh

Electrolyser 190 MWh
Battery 165 MWh
Heat Pump 590 MWh

Source: 5th All Partners Event – Presenting Roadmaps, INDY.

AVL Contribution for INDY II (SENTINEL)

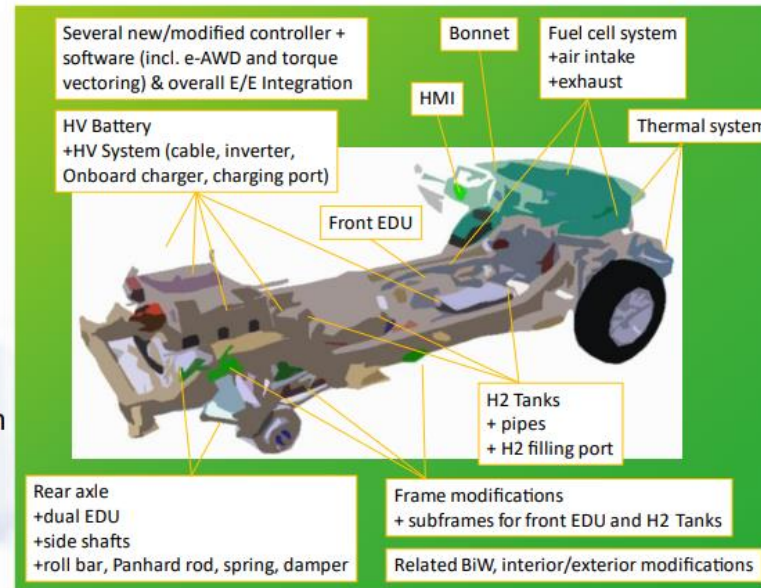
Project goals

- Convert an ICE powertrain INEOS Grenadier into a FCEV
- Proof similar on- and offroad performance than actual series ICE version

Project tasks & roadmap

- Product and use-case definition
- Concept development based on virtual development incl. CAD and simulations
- Modification of E/E architecture incl. controller & software (FCEV powertrain-, H2-storage-system-, FuSa-, HMI-, Chassis/eAWD/torque vectoring- controller etc.)
- Procurement, supplier steering and partner (BMW) interaction
- Vehicle modifications and Democar build-up
- Start-up and calibration (on- and offroad)
- H2-/HV-/FuSa-Safety Concept development and -release as well as European Public Road Allowance

VisBOM / Modifications & New Scope



Vision Phase

Prod. Definition Phase

Concept Phase

Series Preparation

Pilot Series

Thank you



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